

CGA Fuel Cell: Sub Systems

Cooling System

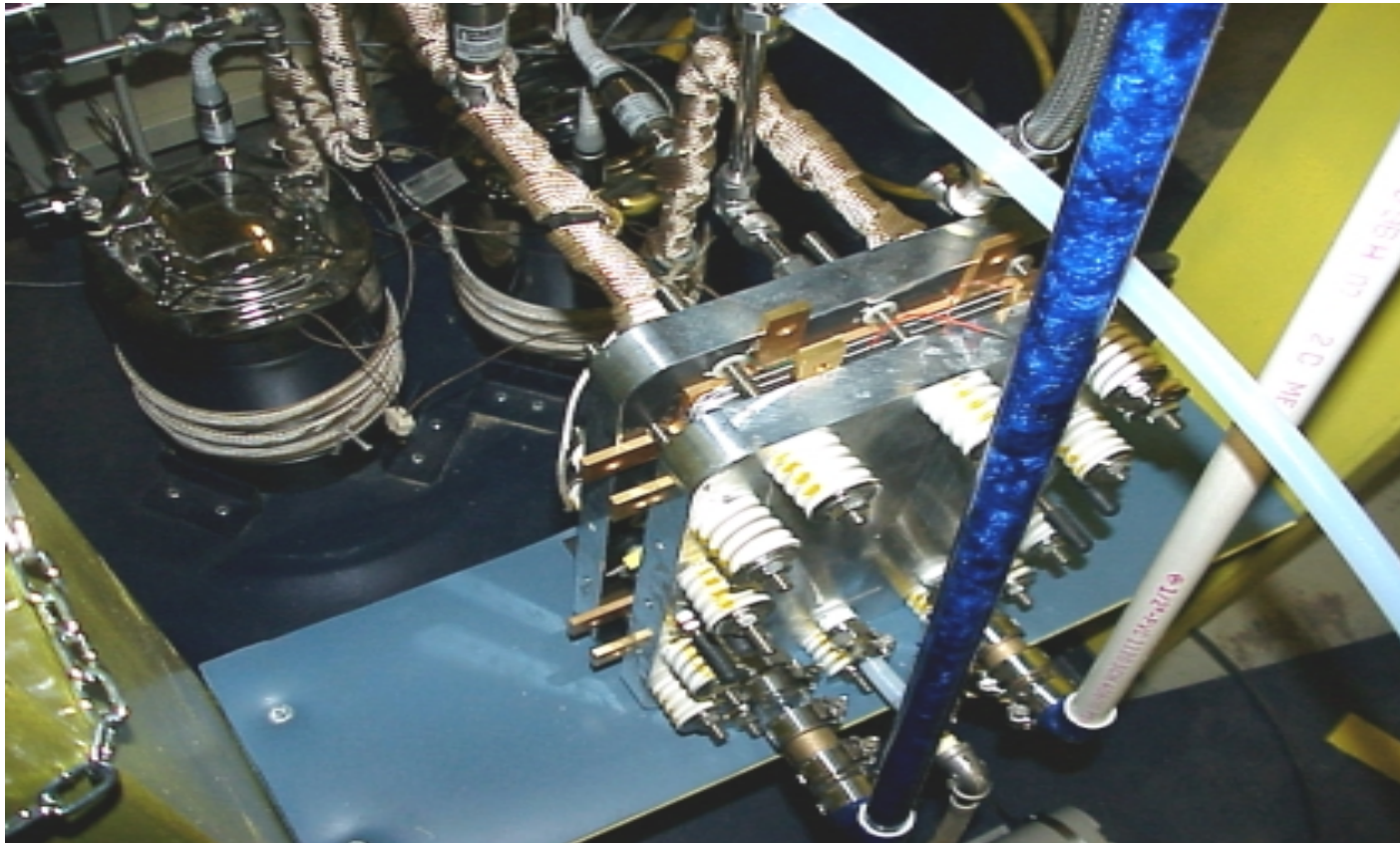


The Fuel Cell uses a pump to circulate approximately 24 liters of water through the cell at up to 4 liters per minute to ensure that the temperature remains below 60 degrees Celsius.

The Load Bank



The Load Bank is a large variable resistor which converts the electrical energy the cell produces into heat. It can create loads between 0 and 1000 watts in increments of 100 watts.



The CGA Fuel Cell is a complex device which requires several subsystems to work together. Without any one of these systems the cell would be inoperable. Shown above are the four individual Cells sandwiched between two metal plates. In the foreground are the exhaust pipes and in the background are the humidifiers and gas supply lines.

Humidification

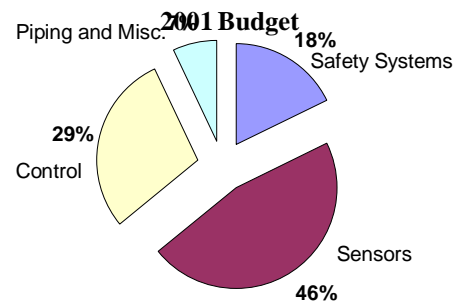


The Humidification System is composed of two stainless steel containers filled with deionized water. The hydrogen or oxygen gas is bubbled through the water and is nearly 100% saturated when it enters the fuel cell. This is necessary to keep the cell's Nafion membrane from drying out, which would render the cell useless.

The Safety System



The Fuel Cell Safety System is composed of two hydrogen sensors which are connected to an alarm system, and a fan which removes exhaust gases from within the metal hood and blows them to the outside. In the piping of the hydrogen line, there is a flame arrestor to prevent flames from reaching the hydrogen tank.



Temperature Control System

The Control System's heart is an Omega Controller. It uses several relay switches to control the heat tapes on the humidifiers and gas lines as well as the fuel cell core heater. These heaters keep temperatures in these zones in line with pre-determined set-points. Thermocouples in each zone measure the temperature.

